Claims

1. A tool magazine system for a machining spindle or machining head, comprising a gripper which picks up tools from a tool magazine, guides them to a machining spindle for example of a machining centre or machine tool, and passes them to said spindle or head, wherein said gripper is fed to said tool laterally with respect to the axis of rotation or longitudinal axis of said tool, particularly substantially at right angles to that axis, and grasps said tool.

2. A tool magazine system according to claim 1, wherein said gripper is arranged on a manipulator and mounted for multi-axial movement.

3. A tool magazine system according to claim 1 wherein said tool magazine is in the form of a tool rack in which at least two bases are substantially superimposed, and said bases hold said tools in appropriate storage devices.

4. A tool magazine system according to claim 3 wherein a dripping sheet is provided above said storage device.

5. A tool magazine system according to claim 1 wherein a drip trough for collecting dispersed cooling liquid is provided below said tool magazine, and said drip trough is connected to the cooling liquid circuit.

6. A gripper for grasping, conveying and/or passing on a tool, particularly for conveying a tool from a tool magazine to a work spindle, the tool in particular having a shank, wherein a groove, recess, shoulder or the like with which a first member

of the gripper interacts is provided in said surface of the shank or tool, and a second member of the gripper interacts with a different region of said shank or tool, wherein said second member of said gripper lies against said surface of said shank or the outside diameter of said tool.

7. A gripper according to claim 6, wherein said second member has at least two contact surfaces, and said tool is located in said gripper between those contact surfaces, and held with a clamping action.

8. A gripper according to claim 6 wherein said second member has a claw-like structure and said claw engages over at least half of the diameter of said tool shank or tool.

9. A gripper according to claim 6 wherein said first member has at least one spring-like contact surface which engages in a peripheral groove or slot in said tool shank or tool.

10. A gripper according to claim 6 wherein said first member and said second member can be moved relative to each other, and in particular can be moved linearly or swivelled towards each other.

11. A gripper according to claim 6 wherein said first member is stationary relative to the gripper and the second member is constructed for movement towards it.

12. A gripper according to claim 6 wherein said second member comprises at least two elements which interact in the manner of claws or tongs.

13. A gripper according to claim 1 wherein functional surfaces are provided on said tool shank and are not covered and/or touched by said members and/or elements when said tool is grasped by said gripper.

14. A gripper according to claim 6 wherein a hydraulic or pneumatic operating cylinder, an electric motor or a separate actuating means act as a drive for said members and/or elements of said gripper.

15. A gripper according to claim 6 wherein said members/elements which can be moved towards each other may be fixed to each other.

16. A gripper according to claim 6 wherein said members/elements which can be moved towards each other have a locking means.

17. A gripper according to claim 6 wherein said dimension of said tool shank, particularly said diameter of said shank is larger than said dimension or respectively said diameter of said tool, and said second member moves at least section-wise axially or at an acute angle to said longitudinal axis of said tool when it grasps/lets go of the tool.

18. A gripper according to any of preceding claims 6 to 17, characterised in that in grasping said tool said contact surface of said first member first engages in said annular slot, groove, recess or shoulder of said tool or tool shank, and said second member previously, simultaneously or subsequently grasps the surface of said tool shank or tool with a clamping action.

19. A gripper according to claim 6 wherein on letting go of said tool said second member moves away from said shank and overcomes said clamping, in that said first member forms an abutment for that purpose in its interaction with said tool or tool shank.

20. A gripper according to claim 6 wherein a position-securing means for radial alignment of said tool is provided on said gripper, particularly on said first member.

21. An encircling system for encircling an article such as a tool, the system comprising two grippers, wherein said grippers are rotated about an axis normal to the longitudinal axis of said tool and engage said tool, particularly on opposing sides of the workpiece.

22. An encircling system according to claim 21, wherein said first member respectively of said grippers engages in said peripheral groove in said tool or tool shank and puts respectively said second member on a respective shank section adjacent said groove.

23. A machine tool with a gripper according to claim 6 to 20, a tool magazine system according to claim 1 and/or an encircling system according to claims 21.

24. A machine tool according to claim 23 for machining workpieces.